

CLAIMS

1. A bi-stable microswitch including a pair of contacts and an armature movable between a first position and a second position to selectively break or make the pair of contacts, the armature being latched in the second position by a magnetic path including a permanent magnet and a magnetisable element having a first temperature, wherein the armature is resiliently biased towards the first position when latched, and is movable from the second position to the first position upon heating of the magnetisable element to above the first temperature.
2. A bi-stable microswitch according to claim 1, wherein the armature includes a first section having a first thermal expansion coefficient and a second section having a second thermal expansion coefficient causing movement of the armature from the first position to the second position upon heating of the armature.
3. A bi-stable microswitch according to claim 2, wherein the first section of the armature is at least partially formed of permalloy.
- Sub 117 4. A bi-stable microswitch according to either one of claims 2 or 3, wherein the second section of the armature is at least partially formed of invar.
5. A bi-stable microswitch according to any one of the preceding claims, and further including a first heating device formed on or proximate the armature.
6. A bi-stable microswitch according to any one of the preceding claims, and further including a second heating device formed on or proximate the magnetisable element.
7. A bi-stable microswitch according to either one of claims 5 or 6, wherein one or more of the first and second heating devices includes an electrical resistance element.

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8. A bi-stable microswitch according to any one of claims 1 to 4, wherein heat is applied to at least one of the armature and the magnetisable element by means of electromagnetic radiation.

5 9. A bi-stable microswitch according to claim 8, wherein microwave or other radiation is applied by non-contact means from a remote location.

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10. A bi-stable microswitch according to any one of the preceding claims, wherein the magnetisable element is at least partially formed from a NiCu alloy, the composition of the alloy being adjusted to set the first temperature.

11. A bi-stable microswitch according to claim 1, wherein the pair of contacts are formed in or on an electrically isolating substrate.

15 12. A bi-stable microswitch according to claim 11, wherein the magnetisable element is formed in the substrate, and separated from the pair of contacts by an electrically isolating layer formed in or on the substrate.

20 13. A bi-stable microswitch according to claim 12, wherein the pair of contacts and the magnetisable layer are formed by micro machining techniques.

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14. A bi-stable microswitch according to any one of the preceding claims, wherein the armature comprises a cantilever overhanging the pair of contacts.

25 15. A bi-stable microswitch according to claim 14, wherein the armature is formed by micromachining techniques.

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16. An array of bi-stable microswitches, each microswitch having features according to any one of the preceding claims.

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17. An array of bi-stable microswitches according to claim 16, wherein each of the microswitches is at least partly formed in a common substrate by micro machining techniques.

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Parameter	Value	Unit
Initial temperature	25.0	°C
Final temperature	25.0	°C
Initial pressure	1.013	bar
Final pressure	1.013	bar
Initial volume	0.001	m³
Final volume	0.001	m³
Initial mass	0.001	kg
Final mass	0.001	kg
Initial density	1000	kg/m³
Final density	1000	kg/m³
Initial viscosity	0.001	Pa·s
Final viscosity	0.001	Pa·s
Initial thermal conductivity	0.6	W/m·K
Final thermal conductivity	0.6	W/m·K
Initial specific heat capacity	4182	J/kg·K
Final specific heat capacity	4182	J/kg·K
Initial enthalpy	4182	J/kg
Final enthalpy	4182	J/kg
Initial entropy	1.306	J/kg·K
Final entropy	1.306	J/kg·K
Initial internal energy	1674	J/kg
Final internal energy	1674	J/kg
Initial Gibbs free energy	-1674	J/kg
Final Gibbs free energy	-1674	J/kg
Initial Helmholtz free energy	-1674	J/kg
Final Helmholtz free energy	-1674	J/kg
Initial chemical potential	-1674	J/kg
Final chemical potential	-1674	J/kg
Initial activity	1.0	
Final activity	1.0	
Initial fugacity	1.013	bar
Final fugacity	1.013	bar
Initial vapor pressure	0.003	bar
Final vapor pressure	0.003	bar
Initial saturation temperature	0.01	°C
Final saturation temperature	0.01	°C
Initial critical temperature	374.15	°C
Final critical temperature	374.15	°C
Initial critical pressure	220.64	bar
Final critical pressure	220.64	bar
Initial critical density	322	kg/m³
Final critical density	322	kg/m³
Initial critical viscosity	0.055	Pa·s
Final critical viscosity	0.055	Pa·s
Initial critical thermal conductivity	0.12	W/m·K
Final critical thermal conductivity	0.12	W/m·K
Initial critical specific heat capacity	1980	J/kg·K
Final critical specific heat capacity	1980	J/kg·K
Initial critical enthalpy	2085	J/kg
Final critical enthalpy	2085	J/kg
Initial critical entropy	3.155	J/kg·K
Final critical entropy	3.155	J/kg·K
Initial critical internal energy	1915	J/kg
Final critical internal energy	1915	J/kg
Initial critical Gibbs free energy	-1915	J/kg
Final critical Gibbs free energy	-1915	J/kg
Initial critical Helmholtz free energy	-1915	J/kg
Final critical Helmholtz free energy	-1915	J/kg
Initial critical chemical potential	-1915	J/kg
Final critical chemical potential	-1915	J/kg
Initial critical activity	1.0	
Final critical activity	1.0	
Initial critical fugacity	220.64	bar
Final critical fugacity	220.64	bar
Initial critical vapor pressure	220.64	bar
Final critical vapor pressure	220.64	bar
Initial critical saturation temperature	374.15	°C
Final critical saturation temperature	374.15	°C